TEL-A-MODEM MANUAL

CODE-A-PHONE®
A SUBSIDIARY OF CONRAC CORPORATION

TEL-A-MODEM ENHANCEMENTS

A (ANSWER) COMMAND

With **Version 1 (and later)** software, the Answer command (**ATA**) can be used on BOTH line 1 and line 2. The Tel-A-Modem will answer the line that has been selected for modem use.

A Command **Parameters: None**
Answer **Default: None**

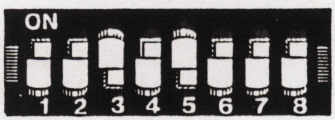
Immediately answers the SELECTED line, initiates answer-state handshake sequence, and modem baud rate adjusts to match the remote system.

NOTE: The Automatic Answer function still operates only on line 2. If Automatic Answer is ON, the Tel-A-Modem will answer line 2.

SWITCH SETTINGS

The Default Switch should be set differently than shown in the TEL-A-MODEM MANUAL:

Switches 3 and 5 up, the rest down



These changes will make most communications software more efficient. Your software may need other switch changes, but we recommend that you try these settings first. Turn the Tel-A-Modem OFF before you make any switch changes.

TEL-A-MODEM ENHANCEMENTS

SET-REGISTER S1

Set-Register S1 is used to identify the revision level of modem software.

S1? S1= **Range: 0 - 255**
Default: Revision Level

Reports the revision level of the modem software. **S1?** identifies Version 0 software as **000**, Version 1 software as **001**, etc.

Using **S1=**, other numbers can be entered without affecting operation. However, with a software reset (ATZ or power off/on), the value of S1 defaults to software revision level.

SET-REGISTER S11

With **Version 1 (and later)** software, the range "unit" value of Set-Register S11 has been changed from 4 milliseconds to 1 millisecond. **Version 0** software uses a 4 millisecond timer, as described in the TEL-A-MODEM manual.

S11? S11= **Range: 50 - 255 Milliseconds**
Default: 70m

Sets touch-tone dialing rate.

The default value of 70 milliseconds is recommended as the minimum length for reliable dialing.

90-DAY LIMITED WARRANTY

CODE-A-PHONE QUALITY FIRST

All of us at Code-A-Phone appreciate the confidence you have shown in our product. In turn we recognize our obligation to provide you with a product which works and keeps on working.

For over 30 years, Code-A-Phone has built a business and a reputation founded on quality. We take pride in the highest quality record of anyone in our industry.

QUALITY FIRST WARRANTY

Code-A-Phone Corporation warrants to the original purchaser only the material and workmanship of this Code-A-Phone equipment for 90 days on parts and labor **after delivery to the original purchaser.**

Code-A-Phone will repair or replace (at Code-A-Phone's option) and return to the original purchaser, the equipment or any part or parts thereof which shall fail due to defective material or workmanship within the prescribed period of time.

In order to obtain warranty service a **dated proof of purchase document** must be provided. For your convenience, keep the dealers dated bill of sale or delivery ticket as evidence of purchase date.

Specific instructions for obtaining Warranty Service are included on the Service Request Form or call the Code-A-Phone Helpline at 1-503-655-0132.

This warranty is limited to defects in material and workmanship, and it does not apply to loss or damage which is the result of accident, misuse, negligence, improper maintenance, alteration or repair by anyone other than Code-A-Phone Corp., lightning or force majeure occurring after delivery to the original purchaser.

ALL OTHER WARRANTIES, EXPRESS, IMPLIED OR STATUTORY, INCLUDING WARRANTIES OF FITNESS FOR A PARTICULAR PURPOSE AND MERCHANTABILITY, ARE EXCLUDED FROM THIS WARRANTY.

The foregoing shall be the sole and exclusive remedy of any person, whether in contract, tort or otherwise, and Code-A-Phone Corp. shall not be liable for incidental or consequential damage or commercial loss, nor for any other loss or damage except as set forth above.

Some states do not allow limitations on how long an implied warranty lasts, or the exclusion or limitation of incidental or consequential damages, so the above limitations or exclusions may not apply to you.

No person is authorized to extend the time of this warranty, or to accept for or on behalf of Code-A-Phone Corp. any other obligation or liability in connection with the sale of this equipment.

This warrantly gives you specific legal rights and you may have other rights which vary from state to state.

This warranty is valid only in the U.S.A.

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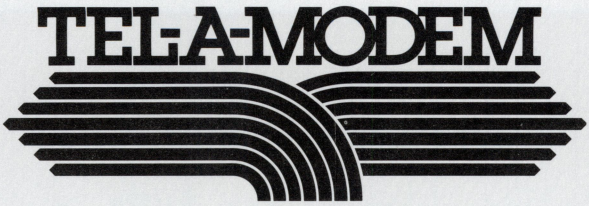
CODE-A-PHONE



CODE-A-PHONE

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SECTION 1

INTRODUCTION

THE TEL-A-MODEM
TEL-A-MODEM FRONT PANEL

THE TEL-A-MODEM

The Code-A-Phone TEL-A-MODEM Model 212A is a two-line telephone integrated with an intelligent modem. The modem operates on-line in full-duplex at 1200 or 300 baud transmission rates, providing Bell System 103 or 212A compatibility in Originate or Answer states. Each telephone line is available for voice or data, allowing simultaneous voice and data communication.

Like other modems, your TEL-A-MODEM provides a means for communication (data transfer) between computers/terminals via the telephone lines. Your TEL-A-MODEM, however, is an INTELLIGENT modem. You can communicate **THROUGH** your TEL-A-MODEM (On-Line Mode), or you can communicate **WITH** your TEL-A-MODEM (Command Mode).

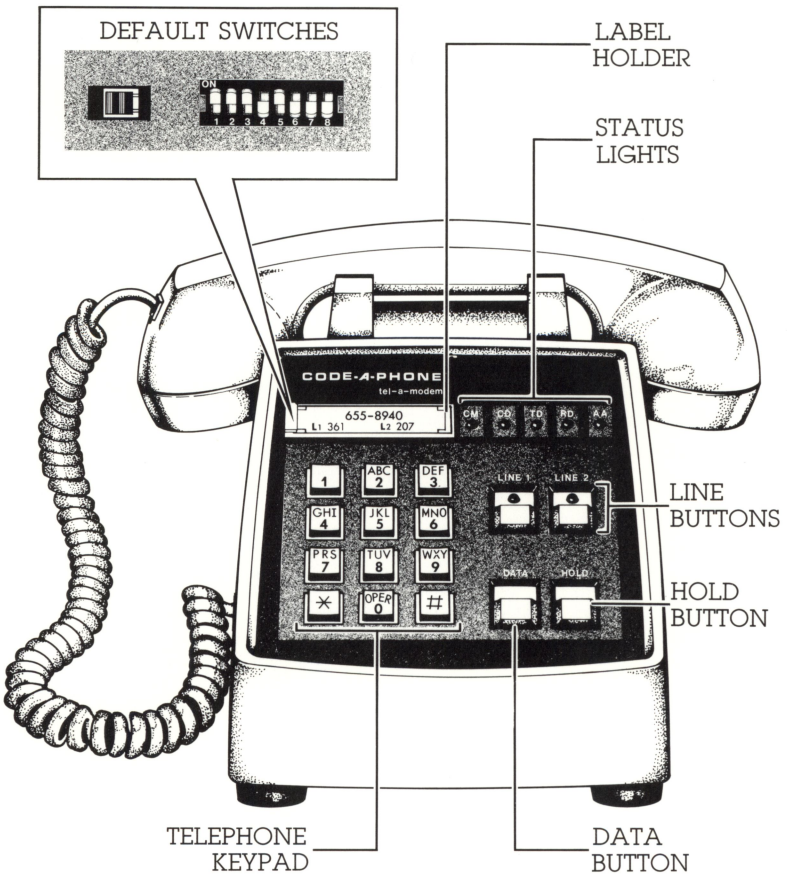
Commands, typed from a keyboard, can instruct the TEL-A-MODEM to dial telephone numbers for you and establish data communication, or answer data calls from remote systems. Other commands can be used to control the way the modem operates.

With status lights and a data line monitor, the TEL-A-MODEM keeps you informed of modem status. When the TEL-A-MODEM processes your commands, it responds with Results Codes to let you know the status of your command.

A DATA button on the TEL-A-MODEM faceplate provides manual data communication capability and alternate voice/data communication. Six Default Switches can be used for manual control of some modem functions.

The two-line memory telephone stores ten telephone numbers, including the last number dialed. Line indicator lights let you know if a line is in use for data, for voice, or on hold.

TEL-A-MODEM FRONT PANEL



Location of Front-Panel Controls

TEL-A-MODEM FRONT PANEL

The **TONE - PULSE SWITCH** (Section 3) controls the dialing method used by the memory telephone.

The **DEFAULT SWITCHES** (Section 5) control various modem functions. Switch settings are factory-selected for operation with most data communication systems. Initially, the switch settings should not need to be changed.

The **LABEL HOLDER** (Section 2) serves as both a switch cover and a holder for a telephone number label. The back of the label contains a guide for switch settings.

The **STATUS LIGHTS** (Section 4) provide visual indications of modem activity.

The **HOLD BUTTON** (Section 3) places either voice telephone line on hold. Hold will not interrupt a line in use for data.

The **DATA BUTTON** (Section 4) initiates/disconnects data communication on either telephone line.

The **LINE BUTTONS** (Section 3) select line 1 or line 2. Line indicator lights glow steadily during telephone (voice) use, blink rapidly during modem (data) use, and blink slowly when the line is on hold.

The **TELEPHONE KEYPAD** (Section 3) is used for normal telephone dialing, as well as for memory dialing and number storage.

SECTION 2

CONNECTIONS

PREPARATIONS
CONNECTING THE TEL-A-MODEM
VOLUME CONTROLS

PREPARATIONS

FEDERAL COMMUNICATIONS COMMISSION

The Code-A-Phone TEL-A-MODEM is registered with the Federal Communications Commission and subject to certain restrictions.

- Read **FCC Requirements, Telephone Company Notification,** and other regulations in Section 9.
- Do not connect the TEL-A-MODEM to a party line.
- Do not connect the TEL-A-MODEM to a coin-operated telephone.
- TEL-A-MODEM repairs must be made by an authorized service agent of Code-A-Phone Corporation.
- Use approved modular wall jacks for telephone line connection (see Section 9).

LOCAL TELEPHONE COMPANY

Your local telephone company must be notified that registered equipment will be connected to the telephone lines.

- Call your local telephone company.
- Provide information from label on bottom of TEL-A-MODEM.
- Provide a list of telephone numbers for lines to be used.

EQUIPMENT

- An RS-323C interface cable is needed to connect your computer or terminal to the DB-25 connector on the TEL-A-MODEM. Your TEL-A-MODEM dealer will have the appropriate cable.
- Your computer/terminal should have an RS-232C serial port.

PREPARATIONS

— You may need a communications software applications package for your personal computer. The TEL-A-MODEM is compatible with most existing software packages.

— Included with your TEL-A-MODEM are the following items:

1 Telephone Handset
1 Handset Coil Cord
2 Telephone Line Cords with Modular Plugs
1 Power Supply
1 TEL-A-MODEM Manual
1 Telephone Number Label/Switch Function Chart

TELEPHONE NUMBER LABEL

A label for your line 1 and line 2 telephone numbers is supplied with your TEL-A-MODEM.

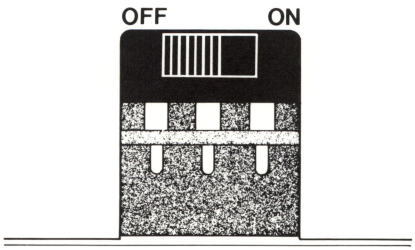
1. Lift (left edge) and remove the plastic label holder on the TEL-A-MODEM faceplate.
2. Remove the telephone number label from the small plastic bag.
3. Enter the appropriate telephone numbers on the paper label.
4. Peel off the release-paper from each end of the label, to expose the adhesive edges.
5. Affix the label onto underside of plastic holder, and replace label holder onto TEL-A-MODEM faceplate.

CONNECTING THE TEL-A-MODEM

Always turn off power to your computer and TEL-A-MODEM when connecting cables, to avoid damage to computer or TEL-A-MODEM.

TEL-A-MODEM POWER SWITCH

The TEL-A-MODEM power switch is located on the rear panel of the TEL-A-MODEM, and is labeled "OFF ON". Be sure that power to your TEL-A-MODEM is turned off during installation.

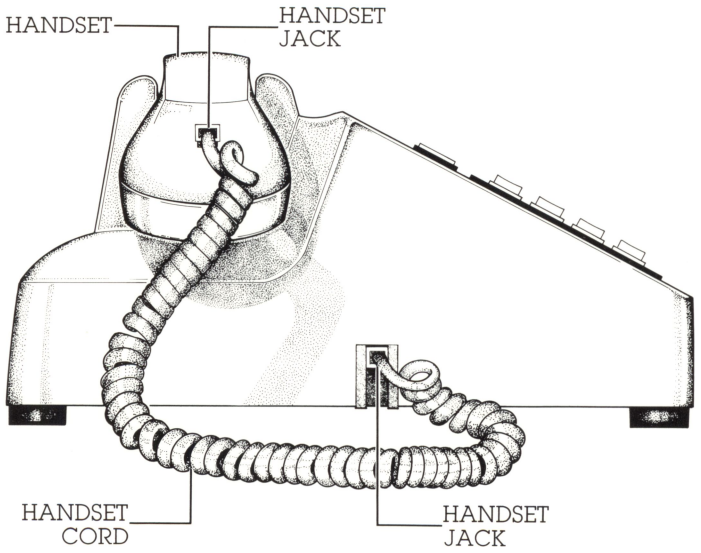


Power Switch (Located on the
Rear Panel of your TEL-A-MODEM)

CONNECTING THE TEL-A-MODEM

TELEPHONE HANDSET

1. Plug one end of the handset coil-cord into the jack on the handset.
2. Plug the other end of the handset cord into the jack on the left side of the TEL-A-MODEM.
3. Place the handset in the cradle.



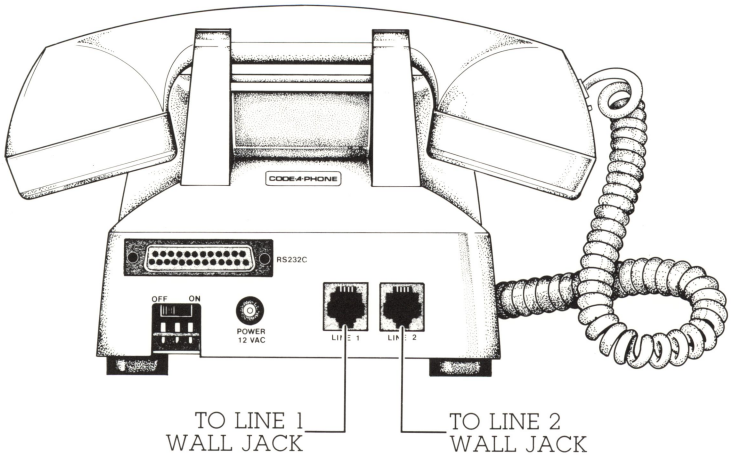
Handset Installation

CONNECTING THE TEL-A-MODEM

TELEPHONE LINE CORDS

The TEL-A-MODEM defaults to line 1 for telephone and line 2 for modem. Power must be on for operation of line 2. However, if you have only one line, connect to the TEL-A-MODEM jack labeled LINE 2.

1. Plug one cord into the TEL-A-MODEM jack labeled LINE 1.
2. Plug the other end of that cord into the wall jack you have chosen for line 1.
3. Plug the second cord into the LINE 2 TEL-A-MODEM jack.
4. Plug the other end of that cord into the wall jack you have chosen for line 2.

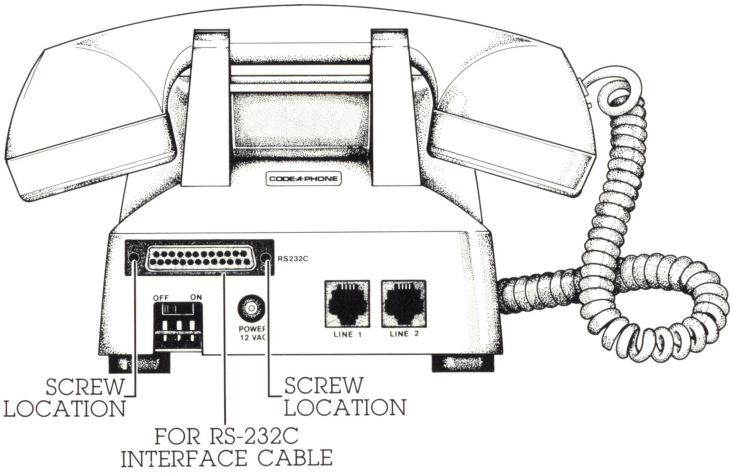


Telephone Line Cord Connections

CONNECTING THE TEL-A-MODEM

RS-232C INTERFACE CABLE

1. Plug the male RS-232C connector into the TEL-A-MODEM DB-25 connector labeled RS-232C, and secure the connector screws.
2. Use the connector on the other end of the RS-232C cable to connect to your computer, and secure the connector screws.



RS-232C Interface Cable Connections

If your computer RS-232C interface is wired as DCE (Data Communications Equipment), you will need the appropriate adapter for your RS-232C cable. Your computer dealer can supply adapters.

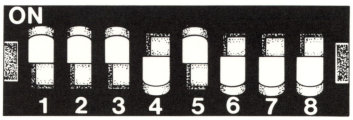
CONNECTING THE TEL-A-MODEM

SWITCH SETTINGS

Default Switches 1 through 6 affect modem operation. The factory-selected settings provide compatibility with most systems and applications.

1. Lift and remove the label holder on the TEL-A-MODEM faceplate.
2. Turn label holder over to view the switch function chart.
3. Check/change switch settings to match the information shown below.
4. Replace the label holder.

Refer to Section 5 for detailed information about Default Switches.



TEL-A-MODEM Default Switches

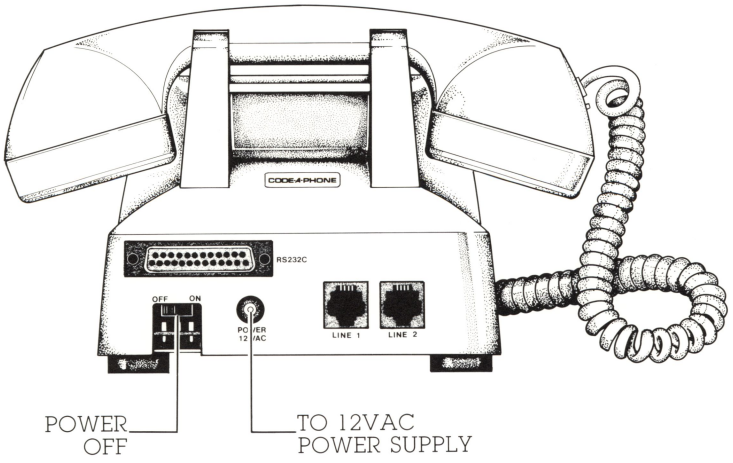
CONNECTING THE TEL-A-MODEM

TYPICAL DEFAULT SWITCH SETTINGS		
SWITCH	SETTING	FUNCTION
1	ON	Overrides the RS-232C DTR (data terminal ready) signal so that the modem receives the logic TRUE DTR signal it requires in order to process commands.
2	ON	Forces a logic TRUE at RS-232C carrier detect lead, for Command Mode communication. Many computers require the logic TRUE status before data from the TEL-A-MODEM can be accepted.
3	NO	The TEL-A-MODEM will not automatically answer the telephone line.
4	8	Sets modem data format to 8 bits.
5	YES	Results Codes **ARE** sent to the computer.
6	WORD	Results Codes are sent as English words.
7		Not used.
8		Not used.

CONNECTING THE TEL-A-MODEM

POWER SUPPLY

1. Ensure that the TEL-A-MODEM power switch is OFF.
2. Connect the power cord of the 12VAC power supply to the TEL-A-MODEM jack labeled POWER 12VAC.
3. Connect the power supply plug to a 110VAC wall outlet.



Power Supply Connection

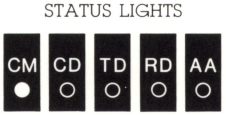
Always use a power supply with an output of 12VAC with your TEL-A-MODEM.

CONNECTING THE TEL-A-MODEM

SYSTEM POWER

The TEL-A-MODEM defaults to the preselected operating conditions. The CM (Command Mode) status light indicates that the TEL-A-MODEM is ready to receive commands.

1. Move the TEL-A-MODEM power switch to ON.



CM Status Light Comes ON

Power for line 1 is supplied through the telephone lines. With the power switch OFF, line 1 remains operational. The power switch must be ON for modem operation as well as operation of line 2 and the indicator lights.

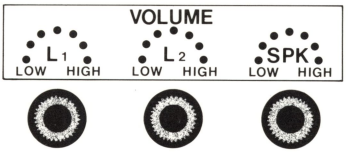
2. Turn on power to your computer/terminal.
3. Load communications software for your computer.
   — Refer to the manual for your communications software.

VOLUME CONTROLS

VOLUME ADJUSTMENT

Three volume controls are located on the bottom of the TEL-A-MODEM.

— The control labeled L1 adjusts line 1 ring volume.
— The control labeled L2 adjusts line 2 ring volume.
— The control labeled SPK adjusts speaker volume for the modem line monitor.



Volume Controls

Lines 1 and 2 have distinctive ring signals. The volume controls provide additional variation.

For data calls only, the line monitor provides audible verification of call progress, including dialing sequence, ring or busy signals, carrier and data signals.

SECTION 3

MEMORY TELEPHONE

TELEPHONE BASICS
STORING NUMBERS IN MEMORY
MEMORY DIALING
SPECIAL FEATURE DIALING

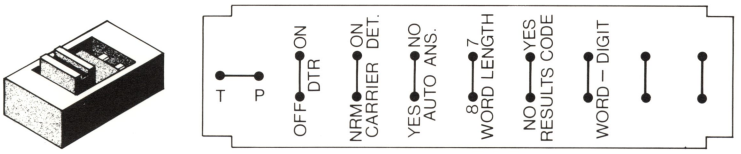
TELEPHONE BASICS

SELECT THE DIALING METHOD

The Tone-Pulse switch affects the dialing method used by the telephone. It does not affect dialing for computer-dialed calls.

The TEL-A-MODEM can be used on touch-tone systems or on rotary (pulse) systems. A switch (under the label holder) controls the type of dialing signal the telephone will use.

1. Lift (left edge) and remove the snap-out label holder on the TEL-A-MODEM faceplate.
2. Turn the label holder over for switch function chart, on the back of the paper label.
3. Move the T-P switch to "P" for pulse (rotary) dial systems.
4. Move the T-P switch to "T" for touch-tone systems.



Tone-Pulse Switch/Switch Function Chart

TELEPHONE BASICS

PULSE (ROTARY) DIALING

In the pulse mode, numbers can be key-dialed faster than the actual dialing rate of the TEL-A-MODEM telephone. In a long dialing sequence, the key entered should not be more than 16 numbers ahead of the digit actually being dialed.

LINES 1 AND 2

Although either line can be used for voice communication, the TEL-A-MODEM defaults to line 1 for voice and line 2 for data. Line 1 is operational without AC power. Power must be ON for operation of line 2 and the indicator lights.

PLACE/ANSWER A TELEPHONE CALL

PLACE A CALL

ACTION	RESPONSE
Press LINE button	Indicator light blinks
Lift handset	Dial tone/line indicator light ON
Dial Number	Tones or pulse signals

TELEPHONE BASICS

ANSWER A CALL

(Incoming call)	Distinctive ring/light blinks rapidly
Press LINE button	
Lift handset	Connection/line indicator light ON

HOLD A CALL/RELEASE HOLD

ACTION	RESPONSE
(Active call)	(Off-hook)
Press HOLD button	Active line on hold/light blinks slowly
(Be sure to lift handset)	
Press LINE button	Hold released/connection returned

The hold function can be used for either line 1 or line 2, or both lines can be placed on hold simultaneously. An attempt to place a data call on hold is ignored; HOLD does not affect the line being used for data.

If the line button is pressed with the handset on-hook, on-hold calls will be disconnected.

TELEPHONE BASICS

MEMORY DIALER

Telephone memory allows storage of ten 16-digit numbers, including last number dialed. Dialer memory is retained by alkaline batteries with a life expectancy of 2 to 5 years, depending on use.

LAST NUMBER REDIAL

OFF-HOOK MEMORY REDIAL

ACTION	RESPONSE
Lift handset	Dial tone
Dial *** 0**	Last number dialed is redialed

Each time you dial a call, your TEL-A-MODEM stores the phone number (up to 16 digits) in a temporary "redial" memory. The redial memory "location" is the 0 key. When a different number is dialed, it changes the number stored at location 0.

STORING NUMBERS IN MEMORY

STORAGE BASICS

Telephone keys 1 through 9 are permanent memory locations. A number in redial memory (location 0) can be stored into a permanent memory location.

Numbers to be stored can be dialed with the handset on-hook or off-hook (they are entered into location 0 either way). However, the handset must be ON-HOOK to store numbers in locations 1 - 9. To ensure number storage, wait one second before starting any other operation.

The telephone memory will not store * or # as a **signaling** digit.

STORE A NUMBER

ON-HOOK	DIAL NUMBER	MEMORY LOCATION
	5 5 5 1 2 1 2	

ACTION	RESPONSE
Handset on-hook	
Dial number	Number stored in REDIAL memory (0)
Dial *** * 5**	Number stored in PERMANENT memory, at location 5

To clear previous digits or correct a mistake, lift and replace the handset and start over.

STORING NUMBERS IN MEMORY

PAUSE IN DIALING SEQUENCE

Pauses may be needed in a dialing sequence to access a PBX system or to wait for additional dial tones. The memory telephone uses the pound (#) key to store pauses in memory.

When a pause code (#) is entered into memory, dialing stops at the pause code. Dialing resumes with a "continue command" (refer to Memory Dialing).

EXAMPLE: STORE A PAUSE FOR ADDITIONAL DIAL TONE

ON-HOOK	DIAL	PAUSE	DIAL NUMBER	MEMORY LOCATION
	9	#	5 5 5 1 2 1 2	* * DEF 3

ACTION	RESPONSE
Handset on-hook	
Dial initial number	Number (9) stored in REDIAL memory
Dial **#**	Pause (#) stored in REDIAL memory
Dial remaining number	Number stored in REDIAL memory
Dial *** * 3**	Number, with pause, stored in PERMANENT memory at location 3

More than one pause code can be included in a dialing sequence.

MEMORY DIALING

Numbers stored in memory locations 1 - 9 do not change unless a new number is stored into the permanent location. When numbers are memory-dialed, information in the redial memory (location 0) is not affected.

MEMORY-DIAL A NUMBER

OFF-HOOK MEMORY-DIAL

ACTION	RESPONSE
Lift the handset	Dial tone
Dial * **5**	Number at location 5 is automatically dialed

MEMORY DIALING

MEMORY-DIAL WITH PAUSES

When a pause code is encountered in a memory-dial sequence, a "continue command" is needed to resume the dialing sequence. The location key **or any key except** * will continue the dialing sequence. A continue command is needed for each pause stored in the number.

EXAMPLE: MEMORY-DIAL WITH PAUSE FOR DIAL TONE

OFF-HOOK	MEMORY-DIAL	PAUSE	CONTINUE
		(DIAL TONE)	

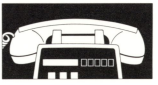
ACTION	RESPONSE
Lift the handset	Dial tone
Dial *** 3**	Access number (at location 3) is dialed Dialing stops at pause code
Wait for dial tone	
Dial **3**	Remainder of number (location 3) is dialed

SPECIAL FEATURE DIALING

Some PBX systems provide special features, such as call forwarding, that use the * and # keys to access the function. On the TEL-A-MODEM telephone, the * and # keys are also used for memory-dial and number storage. **Therefore, the * and # keys are pressed "twice" to access PBX features.**

This section reflects an example only; your PBX system access may differ.

EXAMPLE FEATURE: CALL FORWARDING

OFF-HOOK	FEATURE ACCESS	DIAL	ON-HOOK
		2 5 5 6	

ACTION	RESPONSE
Lift the handset	Dial tone
Press *	No key tone
Press * again	Key tone provided
Dial access number	Second dial tone
Dial forward number	PBX confirmation signal
Hang up handset	

SPECIAL FEATURE DIALING

EXAMPLE FEATURE: CANCEL CALL FORWARDING

OFF-HOOK	FEATURE ACCESS	DIAL	ON-HOOK
	# #	2	

ACTION	RESPONSE
Lift the handset	Dial tone
Press #	No key tone
Press # again	Key tone provided
Dial cancel number	PBX confirmation signal
Hang up handset	

SECTION 4

MODEM GUIDELINES

OPERATION BASICS
STATUS INDICATIONS
COMMUNICATION BASICS
USING THE DATA BUTTON
COMMAND BASICS
DIAL/ANSWER COMMANDS
USING DIAL COMMANDS
AUTOMATIC ANSWER
ALTERNATE VOICE/DATA
DIAL/ANSWER APPLICATIONS
COMPUTER SERVICES

OPERATION BASICS

Your TEL-A-MODEM operates in either the Command Mode or the On-Line Mode. Command Mode provides communication between your TEL-A-MODEM and computer. On-Line Mode allows communication between your computer and a remote system, THROUGH your TEL-A-MODEM. Refer to Section 8 for details.

The transition between Command and On-Line Modes can be accomplished either manually (with the DATA button) or with commands from your computer or terminal.

In Command Mode, the amount of direct interface between you and your TEL-A-MODEM depends on the features of the communications software used in your computer. Refer to the manual for your communications software package for instructions.

STATUS INDICATIONS

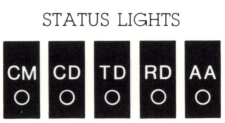
Your TEL-A-MODEM indicates operating status in several ways. The line monitor allows audible verification of data communication. Status lights on the faceplate show modem status. Results Codes provide status of modem/computer activity.

DATA LINE MONITOR

Progress of data calls and automatic answer can be heard on the line monitor speaker. The MONITOR (M) command can be used to control the speaker (refer to Section 6). Different transmission rates (baud rates) produce different sounds on the speaker (refer to Section 8).

STATUS INDICATIONS

MODEM STATUS LIGHTS



TEL-A-MODEM Status Lights

CM (Command Mode) Light. ON indicates that TEL-A-MODEM is in Command Mode. OFF indicates that TEL-A-MODEM is in On-Line Mode.

CD (Carrier Detect) Light. ON indicates that the TEL-A-MODEM "recognizes" a remote system. OFF indicates that no carrier signal is detected.

TD (Transmit Data)/RD (Receive Data) Lights. ON/OFF during data communication indicates data being transmitted and received.

AA (Automatic Answer) Light. ON indicates that TEL-A-MODEM is in Auto Answer mode. OFF indicates that Auto Answer function is off.

LINE (1 or 2) Lights. BLINK rapidly to indicate in-use for data. (Line lights also show telephone status with steady glow for voice use and slow blink when on hold.)

ACTIVITY STATUS

The TEL-A-MODEM can provide Results Codes to your computer. Results Codes can also appear on your computer screen, if your communications software supports the return of codes.

STATUS INDICATIONS

Results Code format can be digits or words. Results Codes and their format are controlled by switch settings or by commands.

TEL-A-MODEM RESULTS CODE DESCRIPTIONS		
DIGITS	WORDS	EXPLANATIONS
0	OK	No errors occurred during execution of command; ready for next command.
1	CONNECT	300 or 1200 baud carrier signal is detected (refer to X0 command), or 300 baud carrier signal detected (refer to X1 command).
2	RING	Ring signal is detected; if Auto-Answer is on, or if an A command is used, the TEL-A-MODEM will answer.
3	NO CARRIER	Carrier signal was not detected, or the signal was lost.
4	ERROR	Command line contains an error.
5	CONNECT 1200	1200 baud carrier signal is detected (refer to X1 command).

COMMUNICATION BASICS

Data communication starts with an exchange of signals known as "handshaking". The signals differ for an ORIGINATE-state handshake or an ANSWER-state handshake. The DATA button initiates ORIGINATE handshaking only; it cannot be used to answer a data call. If the DATA button, or any computer key, is pressed DURING handshaking, the call is terminated and a NO CARRIER Results Code is sent.

In ORIGINATE state, TEL-A-MODEM baud rate (transmission speed) adjusts to match the baud rate of your computer. In ANSWER state, the TEL-A-MODEM adjusts to match the baud rate of the remote system. Your computer baud rate must match the rate of the remote system.

USING THE DATA BUTTON

MODEM BAUD RATE

The TEL-A-MODEM identifies your computer baud rate from an "Attention Code" entered at your computer keyboard. If the Attention Code is not entered, your TEL-A-MODEM originates at 1200 baud.

1. Set your COMPUTER baud rate to either 1200 or 300 baud.
2. If your computer is set to 300 baud, type the upper case letters **"AT"** and press the carriage return.

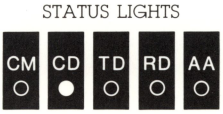
CALL A REMOTE MODEM

1. Press either LINE button, and lift handset.
2. Dial manually or memory-dial a remote modem.

USING THE DATA BUTTON

ORIGINATE COMMUNICATION

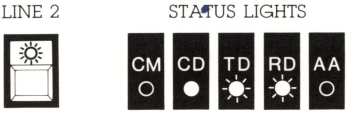
1. When remote modem answers, listen for carrier signal (tone).
2. When remote carrier signal is heard, press and release the DATA button (the handset can then be placed on-hook).



CD (Carrier Detect) Status Light Comes ON

TRANSMIT/RECEIVE DATA

1. For procedures to transmit and receive data, refer to the manual for your communications software.



TD and RD Lights Blink During Data Communication

CONCLUDE THE CALL

1. Press the DATA button to conclude data communication.
   - — With the handset on-hook, the TEL-A-MODEM disconnects from the telephone line and returns to Command Mode.
   - — With the handset off-hook, the modem disconnects but does not hang up the telephone line.

COMMAND BASICS

Handshaking can be initiated via computer commands in **either** the ORIGINATE state or the ANSWER state. Before attempting data communication with commands, you should be familiar with basic command usage and the TEL-A-MODEM dial/answer commands.

Commands are characters used to specify instructions to the TEL-A-MODEM. **Parameters** are values that affect the function of commands. **Command Lines** consist of an attention code, commands, and applicable parameters.

Command Buffer

As command lines are typed, they are stored in the command "buffer" (a temporary memory). Buffer capacity is 40 characters, **not** including spaces or control characters.

Attention Code (AT)

All command lines must begin with **AT,** unless otherwise noted. **AT** must be typed in upper case characters. The AT code adjusts modem baud rate to match the computer, and clears the command buffer.

A/ Code

The **A/** code repeats the previous command line. The **A** must be typed in upper case characters. Instead of the attention code (AT), the **A/** is entered and **no** carriage return is used.

Carriage Return

Command lines must end with a carriage return, unless otherwise noted.

COMMAND BASICS

Backspace Key

Before the carriage return is entered, a command line can be edited with the backspace key.

Command Format

Spaces are not necessary between command characters. Spaces can be added for clarity, without using buffer space. Punctuation (such as parentheses or hyphens) can be included in telephone numbers, but punctuation uses buffer space.

Missing Parameter

If a parameter value is not specified with the command (when appropriate), a value of 0 will be used for that parameter.

Z (Reset) Command

The Reset (Z) command resets TEL-A-MODEM software to default values.

Dialing Method

Modem dialing is a separate function from telephone dialing. The Tone/Pulse Switch does not affect modem dialing. The modem also supports the tone signals generated by the star (*) and pound (#) keys, for use with some computer services.

Escape Code

In the On-Line Mode, an escape code transfers the TEL-A-MODEM back to Command Mode without disconnecting from the telephone line.

DIAL/ANSWER COMMANDS

L (LINE) 1 - 2	Selects the line to be used by the modem. **Line 1 does not support answer state.**
L?	Reports the line currently selected for modem use.
D (DIAL)	Connects to telephone line, dials a number, and initiates an ORIGINATE handshake.
T (TONE)	Sets touch-tone signals for modem dialing. Defaults to PULSE with power on or after a Reset (Z) command.
P (PULSE)	Sets pulse signals for modem dialing.
R (REVERSE)	Originates a call in ANSWER state, for calling an originate-only modem.
, (PAUSE)	The **, (comma)** command places a timed pause in a dialing sequence before continuing to dial.
; (RETURN-TO-CM)	The **; (semicolon)** command causes the TEL-A-MODEM to return to Command Mode after dialing, for additional commands.
H0 (HANG-UP)	Disconnects from the line and returns to Command Mode.
A (ANSWER)	Initiates the ANSWER state, and answers a data call.

USING DIAL COMMANDS

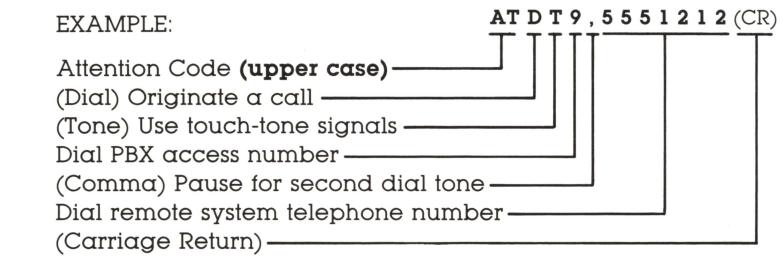
COMPUTER BAUD RATE

Set your computer baud rate to either 300 or 1200 baud, to match the rate of the remote system you will call.

ENTER A DIAL-COMMAND LINE

Either line can be selected with a line command (L1 or L2). With no line specified, the TEL-A-MODEM defaults to line 2 for modem use.

1. Type a dial command line on computer keyboard.


EXAMPLE:
AT D T 9 , 5 5 5 1 2 1 2 (CR)
Attention Code (upper case)
(Dial) Originate a call
(Tone) Use touch-tone signals
Dial PBX access number
(Comma) Pause for second dial tone
Dial remote system telephone number
(Carriage Return)

2. Press the return key on computer keyboard.
3. Listen to call progress via the line monitor speaker.

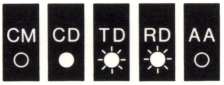
Related Results Code/CD Light ON

USING DIAL COMMANDS

TRANSMIT/RECEIVE DATA

1. For procedures to transmit and receive data, refer to the manual for your communications software.

STATUS LIGHTS



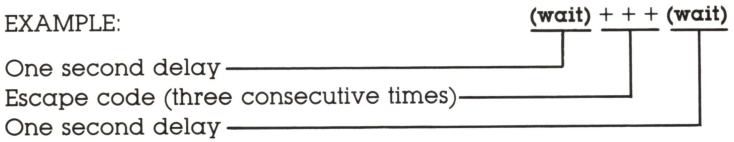
TD and RD Lights Blink During Data Communication

CONCLUDE DATA COMMUNICATION

The DATA button can be used instead of the following steps, to conclude data communication.

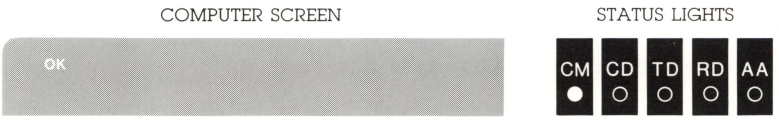
1. Wait one second following the last character transmitted.
2. Type the escape code (+) **three consecutive times,** then wait one second.

EXAMPLE:



— The TEL-A-MODEM returns to Command Mode, but does not disconnect from the telephone lines.

USING DIAL COMMANDS



Related Results Code/CM Light ON

3. Type a hang-up command (H) to disconnect from the telephone line.

EXAMPLE: **AT H** (CR)

Attention Code **(upper case)**
(Hang up) Disconnect from telephone line
(Carriage Return)

DIAL COMMAND FORMATS

Commands that are not related to dialing can be included in a dial command LINE. However, these other commands should be entered before the dial command set.

If the dial command ends with a semicolon (;), other commands can follow the semicolon.

EXAMPLE: **AT M2 L1 D T 555-1212 ; S2=35**

AUTOMATIC ANSWER

Automatic Answer operates on line 2 only. If either line is in use for data, Automatic Answer is disabled.

When Auto Answer is on, the TEL-A-MODEM automatically answers line 2 on the first ring, starts an ANSWER handshake sequence, and adjusts to the baud rate of the remote (calling) system.

Auto Answer is enabled/disabled with Default Switch 3 or with an S-Register Command (S0). However, Auto Answer will revert to the switch setting with a software reset (Z Command).

ENABLE AUTO ANSWER - WITH DEFAULT SWITCH 3

1. Lift and remove the label holder on the TEL-A-MODEM faceplate.
2. Move Switch 3 to the YES (down) setting.
3. Type a reset command (Z) to reset modem software.

EXAMPLE: **AT Z** (CR)

Attention Code **(upper case)**
Reset software to default values

ENABLE AUTO ANSWER - WITH S-REGISTER COMMAND

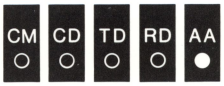
1. Type the S-Register command "S0=1" on computer keyboard.

EXAMPLE: **AT S0 =1** (CR)

Attention Code **(upper case)**
Register address
Change register value to specified value (1)

AUTOMATIC ANSWER

STATUS LIGHTS



AA Light Indicates Auto Answer is ON

AUTO ANSWER OPERATION

1. When line 2 rings, let the TEL-A-MODEM answer.
   - — The TEL-A-MODEM automatically answers on the first ring and enters ANSWER handshaking.
   - — After a successful handshake, the TEL-A-MODEM adjusts baud rate, enters On-Line Mode, and sends a CONNECT Results Code. It may be necessary to change your computer baud rate to match the calling system.
   - — When the remote carrier signal is lost, the TEL-A-MODEM disconnects, returns to Command Mode, and sends a NO CARRIER Results Code.

COMPUTER SCREEN

```
RING

CONNECT

NO CARRIER
```

Related Results Codes for Auto Answer

ALTERNATE VOICE/DATA

TRANSFER FROM VOICE TO DATA — ORIGINATE

1. Establish voice communication.
2. When ready to transfer to data, have remote system type an **A** command (or otherwise enter ANSWER state).
3. Originate data communication.

   — Press the DATA button and hang up.

   OR

   — Enter a **D** command to pick up the telephone line and initiate the ORIGINATE handshake sequence.

TRANSFER FROM VOICE TO DATA — ANSWER

1. Establish voice communication on line 2.
2. When ready to transfer to data, have remote system type a **D** command (or otherwise enter ORIGINATE state).
3. Enter an **A** command to pick up the telephone line and initiate the ANSWER handshake sequence.

TRANSFER FROM DATA TO VOICE

1. Establish data communication manually or with commands.
2. While in On-Line Mode, lift the handset and ensure that the data line is selected.

   — Data "noise" can be heard through the handset.

ALTERNATE VOICE/DATA

3. Press the DATA button to disconnect the modem from the telephone line.

   — The telephone line remains available for voice communication.

4. To return to data communication, follow the procedures to "Transfer from Voice to Data".

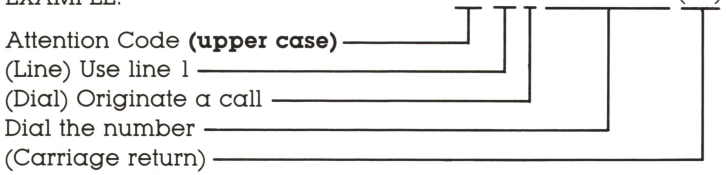
DIAL/ANSWER APPLICATIONS

Your communiation software may allow storage of dial command lines in memory.

AUTO-DIAL VIA COMPUTER - METHOD 1

1. Press the telephone LINE button for the line you will use.
2. Type a dial command line, including the corresponding line (L) command.

EXAMPLE: **AT L1 D 5 5 5 1 2 1 2** (CR)



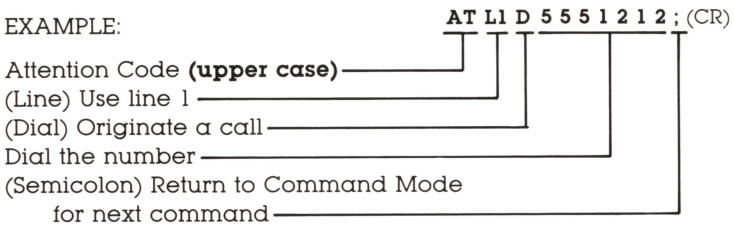
DIAL/ANSWER APPLICATIONS

3. Listen to call progress on line monitor speaker.
4. When dialing is complete lift the handset and press any key on computer keyboard.

   — The TEL-A-MODEM will disconnect and voice communication can begin.

AUTO-DIAL VIA COMPUTER - METHOD 2

1. Press the telephone LINE button for the line you will use.
2. Type a Return-to-CM dial command line (ends with ";"), including the corresponding line (L) command.


EXAMPLE:
AT L1 D 5 5 5 1 2 1 2 ; (CR)
Attention Code (upper case)
(Line) Use line 1
(Dial) Originate a call
Dial the number
(Semicolon) Return to Command Mode
for next command

3. Listen to call progress on line monitor speaker.
4. When dialing is complete, lift the handset and enter a hang-up (H) command line on computer keyboard **(AT H)**.

   — The TEL-A-MODEM will disconnect and voice communication can begin.

DIAL/ANSWER APPLICATIONS

REDIAL A BUSY NUMBER

1. Type **A/**, instead of **AT**, to repeat the previous dial command line.
   - — The TEL-A-MODEM immediately redials (repeats the last command in buffer).
   - — Each time **A/** is entered, the number is redialed.

   A/ cannot be used with auto-dial method 2 because the buffer is cleared by AT in the hang-up command.

ANSWER A DATA CALL

1. Enter an Answer **(A)** command to answer a data call on line 2 **(AT A)**.
   - — The TEL-A-MODEM answers line 2, initiates an ANSWER handshake sequence, and adjusts modem baud rate.

2. If necessary, adjust your computer baud rate to match the rate of the remote system.

COMPUTER SERVICES

With your TEL-A-MODEM and computer, you can communicate with information, news, and banking services. Some services require a subscription or paid connection. For example, **The Source**[SM] is an information and communication service that provides several hundred services. Subscription services provide password access, and will furnish instructions for establishing communication.

The Source is a service mark of Source Telecomputing Corp.

Hundreds of free bulletin board systems are also available. Contact your computer dealer for information about telephone numbers.

CALL A SUBSCRIPTION SERVICE (Example Procedure)

1. Type a dial command line on computer keyboard.

   EXAMPLE: **AT D 9 , 5 5 5 1 2 1 2** (CR)

   Attention Code **(upper case)**
   (Dial) Originate a call
   Dial PBX access number
   (Comma) Pause for second dial tone
   Dial subscription service telephone number

2. Follow "log-on" procedures for your service.

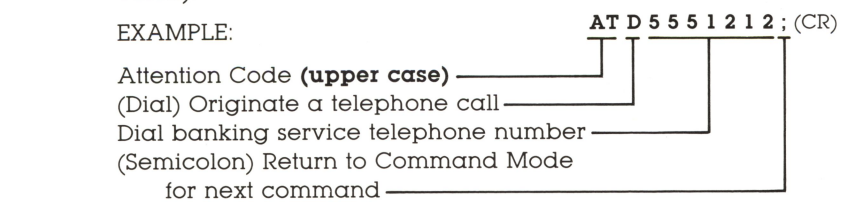
   — You may need to enter 1 to 3 carriage returns for the computer service or bulletin board to identify your system.

COMPUTER SERVICES

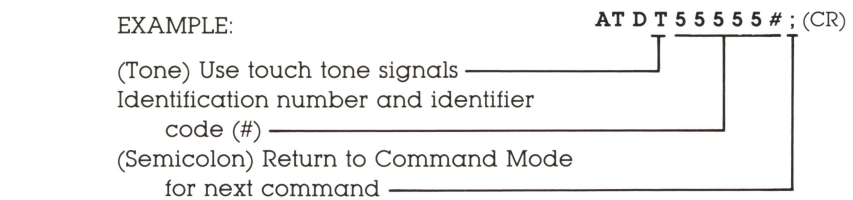
3. When computer service prompt is received, type your identification and/or password.
4. Access the information packages according to instructions from your service.
5. To conclude communication, follow "log-off" procedures for your service.
6. If necessary, enter a hang up (H) command to disconnect from the telephone lines.

CALL A BANKING SERVICE (Example Procedure)

1. Enter a Return-to-CM dial command line (ends with a semicolon).


EXAMPLE:
AT D 5 5 5 1 2 1 2 ; (CR)
Attention Code (upper case)
(Dial) Originate a telephone call
Dial banking service telephone number
(Semicolon) Return to Command Mode
for next command

2. Type another Return-to-CM dial command line to send your identification number, using touch-tones.


EXAMPLE:
AT D T 5 5 5 5 5 # ; (CR)
(Tone) Use touch tone signals
Identification number and identifier code (#)
(Semicolon) Return to Command Mode
for next command

3. Type a Return-to-CM dial command line to send transaction data.

COMPUTER SERVICES

— The Tone (T) command is not necessary because it was entered in the previous command.

EXAMPLE: **AT D 5 5 5 * 5 0 # ;** (CR)

Transaction and identifier codes (* #)
(Semicolon) Return to Command Mode for next command

4. Type a hang up **(H)** command to conclude and disconnect.

EXAMPLE: **AT H** (CR)

(Hang up) Disconnect from telephone lines.

SECTION 5

DEFAULT SWITCHES

DEFAULT SWITCH SETTINGS
DEFAULT SWITCH DESCRIPTIONS

DEFAULT SWITCH SETTINGS

The Default Switch settings affect TEL-A-MODEM operation at power ON and after a Z-Reset command. Switches 7 and 8 are not used. Commands can be used to override some of the switch settings.

The Tone-Pulse switch is not a Default Switch. It controls telephone dialing only, and does not affect command dialing signals.

DEFAULT SWITCH DESCRIPTIONS

Switch 1
DATA TERMINAL READY

Settings: ON (Up) OFF (Down)
Related Command: None

ON (Up)= Overrides the RS-232C Data Terminal Ready (DTR) lead (pin 20), so that the modem receives a logic TRUE DTR signal.

OFF (Down) = If the computer supports DTR, the modem receives the actual DTR signals.

The TEL-A-MODEM needs a logic TRUE DTR signal before commands can be processed. Many computers and terminals do not support DTR. With Switch 1 **ON**, the TEL-A-MODEM can process commands, regardless of the actual status of the DTR signal.

If the computer DOES support DTR, Switch 1 can be set in either position.

DEFAULT SWITCH DESCRIPTIONS

Switch 2
CARRIER DETECT

Settings: ON (Up) NRM (Down)
Related Command: None

ON (Up) = Forces a logic TRUE state on the RS-232C Carrier Detect lead (pin 8).

NRM (Down) = Normal on-line response to logic state of RS-232C Carrier Detect lead (pin 8).

Many computers/terminals will not accept transmitted data unless the RS-232C Carrier Detect signal is ON. With Switch 2 **ON**, the logic TRUE allows the computer to accept data transmitted in Command Mode (when a remote carrier signal is not actually present).

Some computers can respond to the status of the Carrier Detect lead AND accept Command Mode data, regardless of actual Carrier Detect status. With these computers, Switch 2 can be set in either position.

Switch 3
AUTO ANSWER

Settings: NO (Up) YES (Down)
Related Command: S0 (Set-Register)
NO (Up) = TEL-A-MODEM will not automatically answer the telephone.

YES (Down) = TEL-A-MODEM automatically answers line 2 on the first ring.

DEFAULT SWITCH DESCRIPTIONS

Switch 4
WORD LENGTH

Settings: 7 (Up) 8 (Down)
Related Command: None

7 (Up) = Sets modem data format to 7-bit words.

8 (Down) = Sets modem data format to 8-bit words.

Switch 4 is used to set modem data format to match the data format of your computer software.

When communicating at 300 baud, the TEL-A-MODEM transfers data in exactly the same format as it is received. At 300 baud, Switch 4 can be set in either position.

At 1200 baud, parity bit information is modified by timing factors to avoid character loss. Setting Switch 4 to the **8** (down) position retains the data format exactly as received. With Switch 4 at **7**, the parity bit is disregarded.

Data format may be a concern when writing software programs that access the TEL-A-MODEM, or when using the TEL-A-MODEM for transferring files of a specific data format.

DEFAULT SWITCH DESCRIPTIONS

Switch 5
RESULTS CODE

Settings: YES (Up) NO (Down)
Related Command: Q (Quiet)

YES (Up) = Results Codes **ARE** sent to the computer; the TEL-A-MODEM is "not quiet".

NO (Down) = Results Codes **ARE NOT** sent to the computer; the TEL-A-MODEM is "quiet".

With Results Codes, the TEL-A-MODEM provides status information to the computer. With Switch 5 at **YES**, this function is enabled.

Transmission of Results Codes may interfere with a software program, or when used with a printer, Results Codes may not be desired. With Switch 5 at **NO**, the Results Code function is disabled.

Switch 6
(Code Format)

Settings: DIGIT (Up) WORD (Down)
Related Command: V (Verbal)

DIGIT (Up) = Results Codes are single digits.

WORD (Down) = Results Codes are English words.

With software support, Results Codes can appear on the computer screen. The **WORD** setting provides a verbal format that is easily understood. The **DIGIT** setting may be preferable for interface with some software programs.

DEFAULT SWITCH DESCRIPTIONS

When a reset (Z) command is used to reset Switch 5 and Switch 6, the change is not reflected after the reset (Z) command. The next command will reflect the new settings.

SECTION 6

COMMANDS/CODES

COMMAND DESCRIPTIONS
ESCAPE CODE DESCRIPTION
ESCAPE CODE FORMAT

COMMAND DESCRIPTIONS

GENERAL INFORMATION

Commands can be entered at the computer keyboard or issued by a software program. Some commands have a range of values (parameters) that affect the function of that command.

The TEL-A-MODEM has built-in default values for many parameters. Default values are applied each time software is reset, with either the Reset (Z) command or at power ON.

If a parameter value is not entered with the command, the TEL-A-MODEM will respond as though a value of 0 (NOT the default value) were entered.

AT Code

ATTENTION CODE Begins ALL command lines, unless otherwise noted.

- — **AT** must be typed in upper case characters.
- — The Attention Code adjusts modem baud rate and clears the command buffer.

A/ Code

REPEAT CODE Repeats the previous command line.

- — **A/** is entered in place of AT, and no carriage return is needed.
- — The **A** must be typed in upper case characters.

COMMAND DESCRIPTIONS

A Command
ANSWER

Parameters: None **Default: None**

Immediately answers LINE 2, initiates answer-state handshake sequence, and modem baud rate adjusts to match the remote system

— Answers line 2 when Auto Answer is off.
— Transfers from voice to data (on line 2), with an ANSWER handshake sequence.

Commands following "A" in the command line will be ignored. Other commands must be entered before the A command. Example: AT M0 A

C Command
CARRIER
SIGNAL

Parameters: 0, 1 **Default: C1**
C0 = Carrier Signal transmission OFF
C1 = Carrier Signal transmission ON

Controls the transmission of a carrier signal.

— Default condition transmits carrier signal automatically when TEL-A-MODEM originates, answers, or goes on-line.
— **AT C1** immediately turns on carrier signal.
— **AT C0** turns off carrier signal for special applications.

After a C0 command, enter C1 or reset software to again transmit carrier signal.

COMMAND DESCRIPTIONS

D Command
DIAL

Parameters: Command Set **Default: None**
Command Set = Digits of telephone number (and * #) and dial-related commands (see T P R , ;)

Connects to telephone line, dials number, and initiates an originate-state handshake sequence.

— **AT D** transfers from voice to data, with an ORIGINATE handshake sequence.
— **AT D 5551212** enters originate state, dials the number, and waits for carrier signal.

E Command
ECHO

Parameters: 0, 1 **Default: E1**
E0 = Data echo eliminated in Command Mode
E1 = Data echo provided in Command Mode

Controls the "echo" of data to the computer screen in Command Mode.

— **AT E0** turns off echo in Command Mode. Enter the **E0** command for communication with a half-duplex computer.
— **AT E1** echoes the data sent to TEL-A-MODEM, by displaying it on the computer screen. The **E1** command is used with a full-duplex computer.

COMMAND DESCRIPTIONS

H Command
HANG UP

Parameters: 0, 1 **Default: H0**

H0 = Hang up (on-hook) to disconnect from line
H1 = Activate (off-hook) line and auxiliary relays

Controls switch hook relays for the modem line.

— **H0** or **H** (alone) disconnects the modem from the telephone line.
— **H1** is used for special applications.

For FCC compliance, the H1 command includes a 2-second delay following off-hook.

L Command
LINE

Parameters: 1, 2, ? **Default: L2**

L1 = Select line 1 for modem use
L2 = Select line 2 for modem use
L? = Report line currently selected for modem

TEL-A-MODEM uses selected line, until line is changed by command or software reset.

— **AT L1** allows ORIGINATE operations only, on line 1.
— **AT L2** is used for originate and answer operations, including automatic answer, on line 2.
— **AT L?** reports the line number of current modem line and the value of last register checked.

The question mark (?) is valid ONLY with the Line (L) command and the S-Register (S) commands.

COMMAND DESCRIPTIONS

M Command
MONITOR

Parameters: 0, 1, 2 **Default: M1**

M0 = Monitor speaker OFF
M1 = Monitor speaker ON until carrier is detected
M2 = Monitor speaker ON

Controls speaker for audio line monitor.

— The **M0** command turns off the speaker and provides silent data communication.
— With the **M1** command, the speaker remains on (through handshaking) until data communication is established.
— The **M2** command leaves the speaker on throughout data communication. To monitor transmission for problems, use the M2 command.

O Command
ON-LINE

Parameters: None **Default: None**

Forces the modem into On-Line Mode.

— **AT O** transfers from Command Mode to On-Line Mode.

From On-Line, enter + + + (escape code) to return to Command Mode. Enter command line, ended with the O command, to return On-Line after commands are processed (example: AT M1 O).

COMMAND DESCRIPTIONS

, Command PAUSE **Parameters: None** **Default: 2 Seconds**

Places a timed pause in the dialing sequence before continuing to dial.

— The , (comma) may be required, for example, to wait for additional dial tone to access an outside line through a PBX system. Additional commas (,) may be inserted for additional pauses.

Pause length is controlled by Set-Register S8; however, sequential commas (,,,) will also increase pause time.

P Command PULSE **Parameters: None** **Default: Pulse**

Uses pulse (rotary) signals to dial subsequent numbers.

— When **P** is entered, numbers will be dialed with pulse signals until a Tone (T) command is entered.
— Pulse and tone can be combined in a dial command to interchange signals in a dialing sequence.

COMMAND DESCRIPTIONS

Q Command
QUIET

Parameters: 0, 1 **Default: Switch 5**

Q0 = TEL-A-MODEM is "not quiet" — Results Codes are sent to computer.
Q1 = Results Codes are not sent to computer — the TEL-A-MODEM is "quiet".

Overrides Default Switch 5 (detailed in Section 5), and controls Results Code function.

— With Results Codes, the TEL-A-MODEM provides status information to the computer.
— Results Codes may not be desirable when the TEL-A-MODEM is used with a printer or with a software program.

R Command
REVERSE

Parameters: None **Default: None**

Reverses to answer-state handshake sequence after origination of a call. Modem adjusts to match baud rate of remote system.

— The **R** command is used to communicate with an originate-only modem.
— With **R** at the end of a dial command, the TEL-A-MODEM originates a call and initiates an answer-mode handshake sequence.

The R should follow the telephone number. Since line 1 does not allow answer operations, the R command can only be used with line 2.

COMMAND DESCRIPTIONS

; Command **Parameters: None** **Default: None**
RETURN-TO-CM

Returns to Command Mode (after dialing a telephone number), without disconnecting from line.

— The ; (semicolon) returns to Command Mode to allow additional command entry before returning to On-Line Mode.

The ; should follow the telephone number in a dial command line.

S Commands **S (0-15) ?** Report value of specified register
S-REGISTER **S (0-15) =** Change value of specified register
ACCESS Refer to Section 7 for details.

T Command **Parameters: None** **Default: Pulse**
TONE

Uses touch-tone signals to dial subsequent numbers.

— When **T** is entered, subsequent numbers will be dialed with touch-tone signals until a Pulse (P) command is entered or software is reset by command (Z) or power OFF/ON.
— Tone and pulse can be combined in a dial command to interchange signals in a dialing sequence.

COMMAND DESCRIPTIONS

Timing parameters related to touch-tone signals are controlled by Set-Register S11.

V Command
VERBAL

Parameters: 0, 1 **Default: Switch 6**
V0 = Results Codes sent as single digits.
V1 = Results Codes sent as English words.

Overrides Default Switch 6 (detailed in Section 5), to control format of Results Codes.

— Some software programs perform more accurately if single-digit codes (**V0**) are used.
— Verbal (English word) codes provide a more understandable response.

X Command
EXTENDED
CODE SET

Parameters: 0, 1 **Default: X0**
X0 = Use Basic Results Code set (0 - 4)
X1 = Use Extended Results Code set (0 - 5)

Selects basic or extended code set for Results Codes.

— **X0** provides a "4" (CONNECT) Results Code for **either** 300 or 1200 baud.
— With **X1**, a "4" (CONNECT) Results Code indicates a connection at 300 baud only. A "5" (CONNECT 1200) Results Code indicates a connection at 1200 baud only.

COMMAND DESCRIPTIONS

Z Command RESET **Parameters: None** **Default: None**

Resets modem software to all default values.

- **AT Z** applies default values for all S-Registers and applicable commands. All Default Switch settings are reflected, and the command buffer is cleared.
- If the telephone handset is off-hook, **AT Z** disconnects the modem from the line, but it does not affect the telephone connection.
- Commands entered (in same command line) after the **Z** command are ignored.

Wait two seconds before entering additional commands, to allow completion of reset operation.

ESCAPE CODE DESCRIPTION

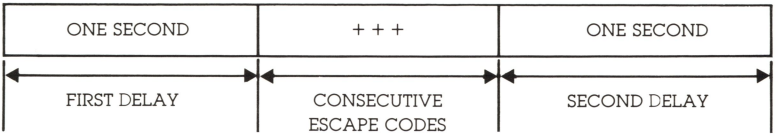
+

ESCAPE CODE Transfers from On-Line Mode to Command Mode, without disconnecting from telephone lines.

- For safety, the Escape Code (+) must be entered three times consecutively and surrounded by one-second delays.
- The TEL-A-MODEM default character for the Escape Code is +.
- The default delay is one second.

Change escape code character with Set-Register S2. Change the delay with Set-Register S12.

ESCAPE CODE FORMAT



Escape Code Format

The first delay is required between the last character transmitted and the first character of the Escape Code. The second delay is required between the last Escape Code character and the first character of the command line.

SECTION 7

SET-REGISTER COMMANDS

S-REGISTER ACCESS
S-REGISTER REFERENCE TABLE
S-REGISTER DESCRIPTIONS

S-REGISTER ACCESS

TEL-A-MODEM software includes sixteen Set-Registers (S0-S15), which control operational and timing parameters. Register commands are used to either verify register values or change register values. When a register value is changed, the TEL-A-MODEM provides a Results Code (OK), rather than displaying the new value.

VERIFY REGISTER VALUE

Enter the **S** command and register number, followed by a question mark **(?)**. On your computer screen, the TEL-A-MODEM displays the value assigned to that register.

AT S6 ?
002 (value in Register S6)
OK

Responses to the question mark (?) are valid ONLY with the S-Register Commands and the Line (L) command.

Enter a series of register numbers, to verify several values. The TEL-A-MODEM displays register values in the same sequence as requested.

AT S2? S7? S8?
043 (value in Register S2)
030 (value in Register S7)
002 (value in Register S8)
OK

S-REGISTER ACCESS

CHANGE REGISTER VALUE

Enter the **S** command and register number, an equals sign (=), and the new value. The new value should be within the range specified for that register.

The TEL-A-MODEM processes the command, provides a Results Code, and waits for next command. To check the new value, follow the steps to Verify Register Value.

AT S6=3 (change value in Register S6 to new value)

OK

Only one Register can be changed within a command; multiple changes require separate commands.

MARK A REGISTER

The **S** command can be used alone to "mark" a certain register. Then, the **?** or = commands can be entered to check or change the marked register at a later time.

S-REGISTER ACCESS

AT S6 ("mark" Register S6)
OK

AT ? (verify value in marked register)
003 (value in marked register)
OK

AT =2 (change value in marked register)
OK

The specified Register remains "marked" until another S command is entered.

BIT MAPPED REGISTERS

Registers S13, S14, and S15 are "bit mapped"; individual bits have separate functions. Access to these registers is for factory testing, rather than for control of the TEL-A-MODEM. Some software programs use these Registers to determine modem/UART status.

S-REGISTER REFERENCE TABLE

REGISTER	RANGE	UNITS	DEFAULT	DESCRIPTION
S0	0-255	Rings	Switch 3	Enable/disable auto answer
S1				This register not used
S2	0-127	ASCII*	43	Escape Code character
S3	0-127	ASCII*	13	Carriage return character
S4	0-127	ASCII*	10	Line feed character
S5	0-32, 127	ASCII*	8	Backspace character
S6	0-255	Seconds	2	Wait time for dial tone
S7	0-255	Seconds	30	Wait time for carrier, after dial or answer
S8	0-255	Seconds	2	Timing for Comma command pause
S9	0-255	1/10 Sec	6	Response time after carrier is detected
S10	0-255	1/10 Sec	7	Wait time between loss of carrier and hang-up

S-REGISTER REFERENCE TABLE

REGISTER	RANGE	UNITS	DEFAULT	DESCRIPTION
S11	0-255	4 Millisec	18	Length and spacing of tone dial signals
S12	0-255	1/10 Sec	10	Delay for escape code
S13	Bit Map			UART status register
S14	Bit Map			Option register
S15	Bit Map			Flag register

* ASCII code, in decimal. A table of ASCII codes and decimal equivalents is provided on the reference card at the end of this manual.

S-REGISTER DESCRIPTIONS

S0? S0= **Range: 0 - 255 Rings Default: Switch 3**

AUTO ANSWER

Enables or disables automatic answer.

- When **S0=0,** automatic answer is disabled. A software reset with Switch 3 at NO (up), sets the value of S0 to 0.
- When **S0=1 or more,** automatic answer is enabled, to answer on the first ring. A software reset with Switch 3 at YES (down), sets the value of S0 to 1.
- Any value greater than 1 equates to 1 in TEL-A-MODEM software.

S1? S1= This register is not used.

The value of S1 defaults to 0. Any other number entered is ignored.

S-REGISTER DESCRIPTIONS

S2? S2= **Range: 0 - 127*** **Default: 43 (+)**
ESCAPE CODE

Sets the ASCII code, in decimal*, used for the escape code character.

— Change the escape code character by changing the value in Register S2.
— A value greater than 127 disables the escape code function, and prevents a return to Command Mode. With escape code disabled, a hang up (H) command cannot be entered; remote system must disconnect.

S3? S3= **Range: 0 - 127*** **Default: 13**
CARRIAGE RETURN

Sets the ASCII code, in decimal*, used for the carriage return control character.

— The carriage return (end-of-line) control character terminates command lines and Results Codes.
— **S3=13** sets the **standard** ASCII value for a carriage return control character.

**** A table of ASCII codes and decimal equivalents is provided on the Reference Card at the end of this manual.***

S-REGISTER DESCRIPTIONS

S4? S4=
LINE FEED

Range: 0 - 127* **Default: 10**

Sets the ASCII code, in decimal*, used for the line feed control character.

— The line feed control character is used with word Results Codes.
— **S4=10** sets the **standard** ASCII value for a line feed control character.
— If the line feed is not necessary for your applications, change Register S4 to a null code.

S5? S5=
BACKSPACE

Range: 0 - 32, 127* **Default: 8**

Sets the ASCII code, in decimal*, used for the backspace control character.

— The backspace control character is used for the backspace key and reverse movement of the cursor.
— **S4=8** sets the **standard** ASCII value for a backspace control character.
— The backspace function may be disabled with values of **33 to 126** (printable ASCII characters).

**** A table of ASCII codes and decimal equivalents is provided on the Reference Card at the end of this manual.***

S-REGISTER DESCRIPTIONS

S6? S6= Range: 0 - 255 Seconds Default: 2.
DIAL TONE PAUSE

Controls length of time the TEL-A-MODEM waits for dial tone, before dialing a telephone number.

— The 2-second default value provides a delay to obtain dial tone from the telephone lines.
— If your telephone equipment requires more time before giving dial tone, increase the value of Register S6.

S7? S7= Range: 0 - 255 Seconds Default: 30
WAIT FOR CARRIER

Determines how long the TEL-A-MODEM will wait for carrier signal from a remote modem.

— If carrier signal is not received within the time specified in Register S7, the TEL-A-MODEM disconnects from the telephone lines.
— If your system often fails to detect carrier, the value of Register S7 may need to be changed.

S-REGISTER DESCRIPTIONS

S8? S8= Range: 0 - 255 Seconds Default: 2
COMMA (,) PAUSE

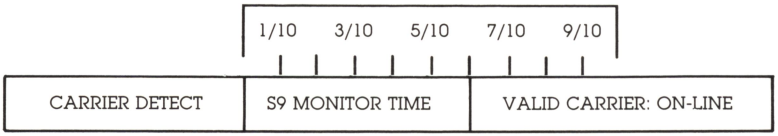
Sets the length of the pause for a comma (,) entered in a dial command.

— A comma (,) in a dial command creates a timed pause before continuing to dial.
— If a longer pause is required, the value of Register S8 can be increased.

S9? S9= Range: 0-255 1/10-Second Default: 6 (6/10)
RESPOND TO CARRIER

Sets the length of time that a carrier signal must be PRESENT to be considered valid.

— After carrier is detected, this "timer" starts to monitor the carrier signal for the length of time set by Register S9.
— If the carrier signal remains for the length of time specified, it is considered valid and the TEL-A-MODEM goes on-line.



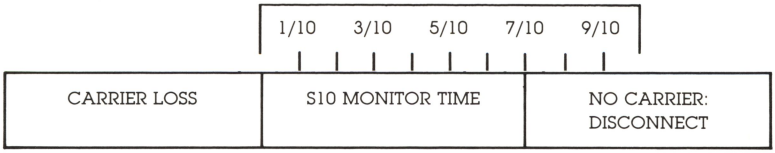
S9 Register Function

S-REGISTER DESCRIPTIONS

— Increase the value of S9 to avoid false-carrier detection resulting from line noise or signals.

Consider the function of Register S10 before changing the value of S9.

S10? S10= Range: 0-255 1/10-Second Default: 7 (7/10)
RESPOND TO LOSS OF CARRIER Sets a delay between loss of carrier signal and TEL-A-MODEM disconnect.

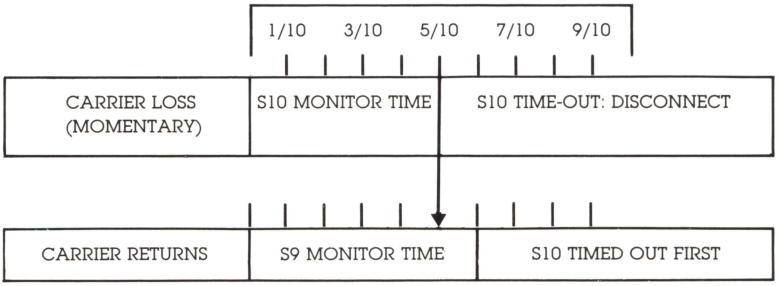


S10 Register Function

— When carrier is MOMENTARILY lost, the delay avoids disconnect. The S10 delay allows S9 to recognize the carrier again and remain on-line.
— If S10=255, carrier detect status is ignored.

S-REGISTER DESCRIPTIONS

If the value of S10 is smaller than the value of S9, any loss of carrier signal causes a disconnect.



S10 Time-Out BEFORE S9 Response

S11? S11= Range: 0 - 255 4-Millisec Default: 18 (72m)
TONE DIAL RATE

Sets tone dialing rate by controlling the duration and spacing of touch-tone signals.

- The default value provides approximately 7/10 second (18 X 4m = 72 Milliseconds).
- As the value of S11 is increased, the dialing rate is decreased.

S-REGISTER DESCRIPTIONS

S12? S12= ESCAPE CODE DELAY **Range: 0 - 255 1/10-Second Default: 10 (10/10)**

Sets the length of the delay before and after an escape code.

- The default value provides a one-second delay. A value of 0 eliminates the timing factor.
- Short delays may not allow ample time to enter the three escape code characters.

S13? S13= UART STATUS REGISTER **Bit Mapped**

Used for factory testing or for status data for some software programs.

S14? S14= OPTION REGISTER **Bit Mapped**

Used for factory testing or for status data for some software programs.

S15? S15= FLAG REGISTER **Bit Mapped**

Used for factory testing or for status data for some software programs.

SECTION 8

OPERATION MODES

MODES AND STATES
COMMAND MODE
WAIT FOR CARRIER (HANDSHAKING)
ON-LINE MODE

MODES AND STATES

The TEL-A-MODEM operates in either the COMMAND MODE or the ON-LINE MODE. The Command Mode allows communication between your TEL-A-MODEM and computer. The On-Line Mode allows data communication between your computer/modem and a remote computer/modem, via the telephone network.

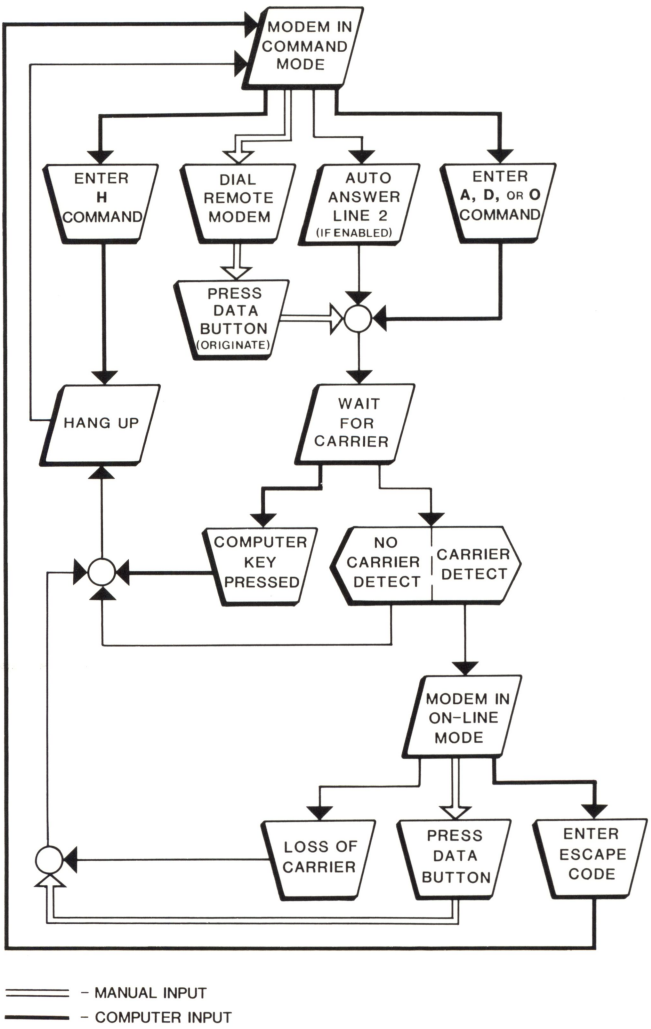
Data communication occurs in either ORIGINATE state or ANSWER state. Signals to originate data communication differ from signals to answer data communication. The signal differences enable the modems to communicate and transfer data to and from the computers.

The TEL-A-MODEM is designed to operate at transmission speeds of either 300 baud or 1200 baud. Modem baud rate adjusts to match your computer baud rate each time an Attention Code (AT) is entered. However, following an ANSWER handshake, the TEL-A-MODEM adjust to match the baud rate of the remote system.

The frequencies and modulation signals required for communication differ for 300 and 1200 baud. As a result, the two transmission rates produce different sounds through the line monitor speaker.

At **300 baud,** the carrier signal is a steady tone produced by both the TEL-A-MODEM and the remote modem. Data transfer "warbles" over the steady tone.

At **1200 baud,** a momentary steady tone is followed by a scrambled carrier signal, from both modems. The scrambled carrier produces "noise" on the line, and data transfer cannot be detected.

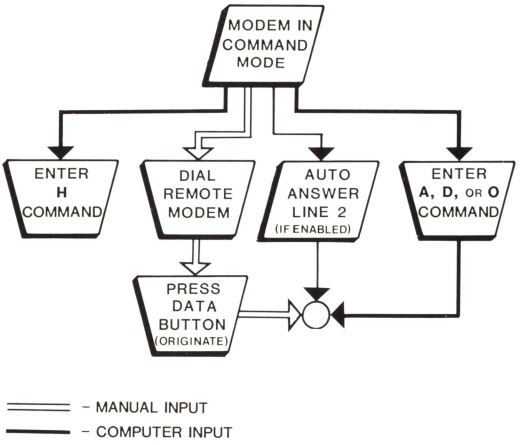


Operation Mode Transitions

COMMAND MODE

The TEL-A-MODEM automatically enters Command Mode when power is turned ON. Instructions can be sent to the TEL-A-MODEM via commands either entered at your computer keyboard or issued through a software program. The TEL-A-MODEM supplies Results Codes to the computer, to provide modem status information.

Some commands are used to select or change parameters that control TEL-A-MODEM operation. Other commands cause a transition from Command Mode to On-Line Mode. The transition between operating modes can also be accomplished manually, or it can occur automatically.


MODEM IN COMMAND MODE
ENTER H COMMAND
DIAL REMOTE MODEM
AUTO ANSWER LINE 2 (IF ENABLED)
ENTER A, D, OR O COMMAND
PRESS DATA BUTTON (ORIGINATE)
– MANUAL INPUT
– COMPUTER INPUT

Command Mode

COMMAND MODE

Computer Input

Answer (A), Dial (D), or On-Line (O) commands initiate a transition to On-Line mode. The Hang-Up (H) command disconnects from the telephone lines and initiates a transition to Command Mode.

Manual Input

Manual dialing establishes telephone line connection with a remote system.

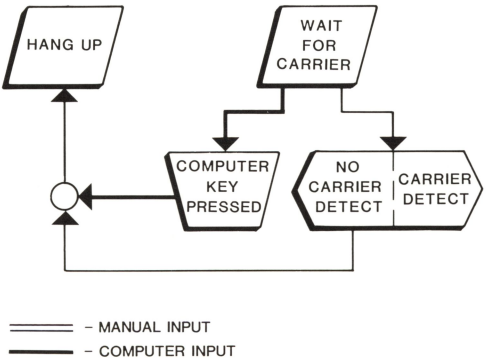
Pressing the DATA button initiates a transition to On-Line Mode, in the ORIGINATE state only. The DATA button does NOT generate Answer-state signals, to respond to an incoming data call.

Automatic Functions

Auto Answer automatically initiates a transition to On-Line Mode, in ANSWER state. Auto Answer operates only on line 2, and the TEL-A-MODEM defaults to line 2 for auto answer.

WAIT FOR CARRIER (HANDSHAKING)

Wait for Carrier, or "handshaking", is the transition from Command Mode to On-Line Mode. Handshaking is an exchange of signals, between modems, to identify transmission speed (baud rate).



Wait for Carrier (Handshaking)

Computer/Manual Input

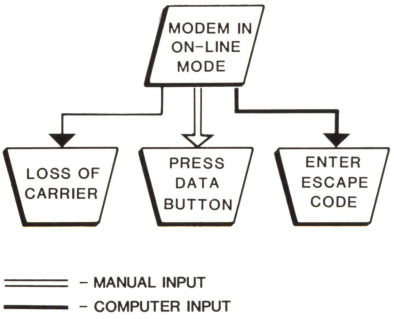
If either the DATA button or a computer key is pressed during handshaking, the TEL-A-MODEM disconnects from the telephone line and returns to Command Mode.

Automatic Functions

The TEL-A-MODEM enters On-Line Mode if carrier signal is detected. If no carrier signal is detected within 30 seconds, the TEL-A-MODEM disconnects and returns to Command Mode.

ON-LINE MODE

In the On-Line Mode, data is transmitted and received between modems over the telephone lines.



On-Line Mode

Automatic Functions

If the remote carrier signal is lost, the TEL-A-MODEM disconnects and returns to the Command Mode.

Manual Input

Pressing the DATA button causes loss of carrier signal, and the TEL-A-MODEM hangs up and returns to Command Mode.

Computer Input

If an escape code is entered, the TEL-A-MODEM reverts to Command Mode without disconnecting. A Hang Up (H) command must be entered to disconnect from the telephone line.

SECTION 9

REGULATIONS

FCC REQUIREMENTS
TELEPHONE COMPANY NOTIFICATION
WALL JACKS/ADAPTERS
TELEPHONE LINE TROUBLE
RADIO/TV INTERFERENCE

SECTION 9 REGULATIONS

FCC REQUIREMENTS

The Code-A-Phone TEL-A-MODEM is registered with the Federal Communications Commission. It meets FCC requirements and may be connected directly to the telephone lines, subject to the following restrictions:

- The TEL-A-MODEM cannot be connected to a party line or a coin-operated telephone.
- The local telephone company must be notified that registered equipment will be connected to the telephone lines.
- To maintain valid FCC registration, any TEL-A-MODEM repairs must be made by an authorized service agent of Code-A-Phone Corporation.

TELEPHONE COMPANY NOTIFICATION

Before your TEL-A-MODEM is installed, the business office of your local telephone company will need the following information:

Telephone numbers with which the TEL-A-MODEM will be used
Model Number
FCC Registration Number
Ringer Equivalence Number

This information (except for telephone numbers) is provided on a label affixed to the bottom of your TEL-A-MODEM.

If the TEL-A-MODEM will be used on several different telephone lines, provide a list of the numbers to the telephone company. If the TEL-A-MODEM is permanently removed from the telephone line, notify your local telephone company. If your telephone company has additional questions, refer them to Code-A-Phone Corporation, Clackamas, Oregon.

WALL JACKS/ADAPTERS

The telephone cords supplied with the TEL-A-MODEM have a modular plug at each end. In accordance with FCC regulations, they must be connected to one of the standard modular jacks listed below.

USOC RJ11C	For residence phones or single-line business phones
USOC RJ12C	For business lines with electronic key systems
USOC RJ13C	For business lines with mechanical key systems

If your telephone system does not use modular jacks, adapters are available. Contact the local telephone company or your Code-A-Phone dealer.

TELEPHONE LINE TROUBLE

If you have trouble with the telephone lines after installation, disconnect the TEL-A-MODEM. If the TEL-A-MODEM appears to be the source of the trouble, do not use it until it has been repaired by an authorized service agent of Code-A-Phone Corporation.

The telephone company has the right to change its equipment, without obligation to ensure that new equipment will be compatible with the TEL-A-MODEM. However, the interface between the telephone lines and your TEL-A-MODEM is functionally identical to the interface between a standard telephone and the telephone lines. Equipment changes are **not** likely to affect your TEL-A-MODEM.

RADIO/TV INTERFERENCE

This equipment uses and generates radio frequency energy. If it is not installed and used properly (that is, in strict accordance with Code-A-Phone instructions), it may cause interference to radio and television reception.

The TEL-A-MODEM has been type tested and found to comply with the limits for a Class B computing device in accordance with the specifications in Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference in a residential installation. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause interference to radio or television reception, which can be determined by turning the equipment on and off, you are encouraged to try to correct the interference by one or more of the following measures.

* Reorient the receiving antenna
* Relocate or move the computer away from the receiver
* Plug the computer into a different outlet, so that the computer and receiver are on different branch circuits

If necessary, consult the dealer or an experienced radio/television technician for additional suggestions.

The booklet "How to Identify and Resolve Radio-TV Interference Problems" may be helpful. It is prepared by the Federal Communications Commission and available from the U.S. Government Printing Office, Washington, DC 20402, Stock No. 004-000-00345-4.

NOTES

NOTES

CODE	DEC	CODE	DEC	CODE	DEC	CODE	DEC
NUL	0	SP	32	@	64	`	96
CTRL A	1	!	33	A	65	a	97
CTRL B	2	"	34	B	66	b	98
CTRL C	3	#	35	C	67	c	99
CTRL D	4	$	36	D	68	d	100
CTRL E	5	%	37	E	69	e	101
CTRL F	6	&	38	F	70	f	102
CTRL G	7	'	39	G	71	g	103
CTRL H	8	(	40	H	72	h	104
CTRL I	9	)	41	I	73	i	105
CTRL J	10	*	42	J	74	j	106
CTRL K	11	+	43	K	75	k	107
CTRL L	12	,	44	L	76	l	108
CTRL M	13	-	45	M	77	m	109
CTRL N	14	.	46	N	78	n	110
CTRL O	15	/	47	O	79	o	111
CTRL P	16	0	48	P	80	p	112
CTRL Q	17	1	49	Q	81	q	113
CTRL R	18	2	50	R	82	r	114
CTRL S	19	3	51	S	83	s	115
CTRL T	20	4	52	T	84	t	116
CTRL U	21	5	53	U	85	u	117
CTRL V	22	6	54	V	86	v	118
CTRL W	23	7	55	W	87	w	119
CTRL X	24	8	56	X	88	x	120
CTRL Y	25	9	57	Y	89	y	121
CTRL Z	26	:	58	Z	90	z	122
ESC	27	;	59	[	91	{	123
FS	28	<	60	\	92	|	124
GS	29	=	61	]	93	}	125
RS	30	>	62	^	94	~	126
US	31	?	63	—	95	DEL	127

PIN NO.	CIRCUIT	DESCRIPTION	DIRECTION
1	AA	Protective GND	Common
2	BA	Transmit Data	To TEL-A-MODEM
3	BB	Receive Data	From TEL-A-MODEM
5	CB	Clear to Send	From TEL-A-MODEM
6	CC	Data Set Ready	From TEL-A-MODEM
7	AB	Signal Ground (Common Return)	Common
8	CF	Carrier Detect	From TEL-A-MODEM
12	CI	High Speed Indicator	From TEL-A-MODEM
20	CD	Data Terminal Ready	To TEL-A-MODEM
22	CE	Ring Indicator	From TEL-A-MODEM

CODE-A-PHONE
A SUBSIDIARY OF CONRAC CORPORATION

16261 S.E. 130th Ave.
Clackamas, Oregon 97015

P.O. Box 5656
Portland, Oregon 97228

AT A/		Attention Code, starts command lines Repeat previous command line
COMMAND	**PARAMETER**	**DESCRIPTION**
A	None	Connect to line 2 in answer state
C	0, 1	C0 = Carrier Signal transmission OFF C1 = Car. Sig. transmission ON
D	Tel.No., Command Set	D = Connect to line in originate state D w/ Number = Dial tel. number Command Set = see **T P R , ;**
E	0, 1	E0 = Do not echo characters in Command Mode E1 = Echo characters in Command Mode
H	0, 1	H0 = Hang up (disconnect) H1 = Activate line/aux. relays
L	1, 2, ?	L1 = Select line 1 for modem L2 = Select line 2 for modem L? = Report current modem line
M	0, 1, 2	M0 = Monitor speaker OFF M1 = Speaker ON until carrier detected M2 = Monitor speaker ON
O	None	Return to On-Line Mode (after an escape code)
,	None	Pause (timed) before continuing to dial (Command Set)
P	None	Pulse dial signals (Command Set)
Q	0, 1	Q0 = Send Results Codes Q1 = Do not send Results Codes
R	None	Originate, then reverse to Answer state (Command Set)
;	None	Return to Command Mode after dialing (Command Set)
S0-S15?	*	Report value of S-Register specified * See S-Register Commands
S0-S15=	*	Change value of S-Register specified * See S-Register Commands
T	None	Touch-tone signals (Command Set)
V	0, 1	V0 = Send digital Results Codes

NUMBERS	WORDS	EXPLANATIONS
0	OK	No errors during execution of command; ready for command
1	CONNECT	Carrier signal detected (with X0); 300 baud carrier signal detected (with X1)
2	RING	Ring signal detected
3	NO CARRIER	Carrier signal was not detected, or carrier signal was lost
4	ERROR	Command line contains an error
5	CONNECT 1200	1200 baud carrier signal detected (with X1)

DEFAULT SWITCHES

SWITCH	RELATED COMMAND	SETTING	FUNCTION
1	None	ON	Overrides RS-232C DTR lead with a logic TRUE
		OFF	Responds to RS-232C DTR signal
2	None	ON	Forces a logic TRUE at RS-232C Car. Det. lead
		NRM	Normal response to logic state of RS-232C CD lead
3	S0=0	NO	TEL-A-MODEM will not auto answer
	S0=1	YES	TEL-A-MODEM auto answers on line 2
4	None	7	Sets 7-bit modem data format
		8	Sets 8-bit modem data format
5	Q0	YES	Results Codes **ARE** sent
	Q1	NO	Results Codes **ARE NOT** sent
6	V0	DIGIT	Digit Results Codes
	V1	WORD	Word Results Codes

REGISTER	RANGE	UNITS	DEFAULT	DESCRIPTION
S0	0-255	Rings	Sw. 3	Enable/disable auto answer
S1				Not used
S2	0-127	ASCII*	43	Escape Code char.
S3	0-127	ASCII*	13	Carriage Return character
S4	0-127	ASCII*	10	Line feed character
S5	0-32, 127	ASCII*	8	Backspace character
S6	0-255	Sec.	2	Wait for dial tone
S7	0-255	Sec.	30	Wait time for carrier
S8	0-255	Sec.	2	Comma pause time
S9	0-255	1/10 Sec.	6	Response time after carrier detect
S10	0-255	1/10 Sec.	7	Wait time between loss of carrier and hang-up
S11	0-255	4 Millisec.	18	Length/spacing of tone signals
S12	0-255	1/10 Sec.	10	Escape code delay
S13	Bit Map			UART Status Reg.
S14	Bit Map			Option Register
S15	Bit Map			Flag Register

Purchase Registration Card CODE-A-PHONE TEL-A-MODEM

Please type or print clearly:

Name _____ Company _____ Title _____

Address _____ City _____ State _____ Zip _____ Telephone _____

Check appropriate items:

1 Ownership:
_____ You _____ Employer
Date of Purchase_____
Serial No. _____

2 Place of purchase:
_____ Computer Store
_____ Department Store
_____ Industrial Distributor
_____ System Supplier
_____ Other

3 To be used with:
_____ Computer
_____
Brand/Model
_____ Terminal
_____
Brand/Model

4 Was your modem purchased with your computer:
_____ Yes _____ No

5 If separately, how much later:
_____ 0-6 months
_____ 7-12 months
_____ 13-18 months
_____ Over 18 months

6 Who made purchase decision:
_____ User
_____ Department
_____
Dept. Name

7 Planned Use (check applicable)
_____ Access comm. services
_____ PC to mini or mainframe
_____ PC to PC
_____ Terminal to mini/mainframe
_____ Word processing transmission
_____ Other _____

8 Use location (as applicable)
_____ Home ____ Office
_____ School

9 If office, type of business:
_____

10 Annual business sales volume:
_____ Under 5M
_____ 5M to 25M
_____ 26M to 50M
_____ 51M to 250M
_____ 251M to 500M
_____ Over 500M

11 Age of primary user:
_____ Under 18
_____ 19 to 25
_____ 26 to 35
_____ 36 to 45
_____ 46 to 55
_____ Over 55

12 Sex of primary user:
_____ Male _____ Female

13 Primary user's occupation:
_____

14 Level of computer skills:
_____ Beginner
_____ Experienced
_____ Very experienced

15 How did you learn about Code-A-Phone products:
_____ Computer Magazine
_____ Other Magazine
_____ Newspaper
_____ Radio/TV
_____ Store
_____ Friend
_____ Other: _____
_____

NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY MAIL

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POSTAGE WILL BE PAID BY ADDRESSEE

CODE-A-PHONE
A SUBSIDIARY OF CONRAC CORPORATION

ATTN: VALUED CUSTOMER DEPARTMENT

P. O. Box 5656
Portland, Oregon 97228